BY ASHTON B. CARTER &
STEPHEN A. LAMONTAGNE

A FUEL-CYCLE FIX

A new international regime could stop nations before they enter the proliferation "red zone."

The crisis over Iran's nuclear ambitions has exposed a dangerous flaw in the international nonproliferation regime: The Non-Proliferation Treaty (NPT) allows signatories to acquire the key building blocks of a nuclear weapons program under the cover of peaceful nuclear power development.

The NPT guarantees non-nuclear weapon states such as Iran the right to develop nuclear energy for peaceful purposes. Many states assert that this right encompasses the entire nuclear fuel cycle, including the uranium enrichment and spent fuel reprocessing facilities needed to produce fuel for nuclear power plants. However, these sensitive facilities also enable states to rapidly produce fissile materials for nuclear weapons. In other words, enrichment and reprocessing facilities allow states to cross into a proliferation "red zone."

Given the resurgent global interest in nuclear power, both the White House and Congress, led by Senate Foreign Relations Committee Chairman Richard Lugar, are sounding alarm bells over the implications of the red zone problem. In particular, as the number of states entering the red zone increases, so too will the risk of nuclear terrorism. Once a state enriches uranium to weapon-grade levels or reprocesses spent fuel to recover plutonium, the resulting fissile materials will remain vulnerable to terrorist acquisition for thousands of years.

But there is a solution to the red zone problem. The international community should create a multinational regime to facilitate production, delivery, removal, and storage of nuclear fuel for all states that abstain from national enrichment and reprocessing programs, submit to strict safeguards, and reaffirm their intention to not pursue nuclear weapons.

National security, economic, and environmental interests all weigh in favor of such a regime. Indigenously fabricating fuel and storing the radioactive spent fuel is an order of magnitude more expensive than buying such services through the existing market. Moreover, multinational spent fuel removal would allow recipient states to avoid the political, environmental, and logistical headaches associated with domestic waste disposal.

Any approach to designing and implementing a multinational fuel cycle supply regime must overcome two major obstacles. First, the regime's success will depend on the credibility of nuclear fuel supply assurances. If potential recipient states believe that policy changes in supplier state governments might jeopardize fuel deliveries and spent fuel removal, then they will be reluctant to forego domestic enrichment and reprocessing. Second, the regime would ignite a debate about the rights of non-nuclear weapon states under the NPT. (Article 4 of the treaty recognizes the "inalienable right of all parties to the treaty to develop research, production, and use of nuclear energy for peaceful purposes.")

In the near term, the most feasible regime design is one that builds on the existing uranium enrichment market and sidesteps a paralyzing debate over Article 4. Specifically, the United States should work through the International Atomic Energy Agency (IAEA) to create a supply consortium consisting of major uranium producers and enrichment companies. The consortium would encourage widespread adoption of the once-through light water reactor fuel cycle (the most attractive option in terms of cost, safety, and proliferation-resistance), and would guarantee the safe and timely supply of low-enriched uranium (LEU) fuel to willing recipient states. If one supplier were unable to fulfill its commitments, the other suppliers would meet the affected recipient state's needs from existing inventories. The defaulting supplier would either have to restock those inventories or reimburse the intervening consortium members.

To provide an additional layer of assurance, supplier state governments should create a "strategic uranium reserve" by either donating LEU fuel (as the United States pledged to do last September) or financing the downblending of surplus Russian weapons-origin highly enriched uranium (HEU) into low-enriched uranium. (This HEU is more than 90 percent uranium 235, while LEU contains less than 5 percent uranium 235.) This LEU, suitable for fuel and not weapons, would be held off the market and either stored entirely in one country or distributed among contributing supplier states, which could count their contributions toward their commitments under the Group of Eight (G-8) Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. A joint committee comprised of representatives from the IAEA and participating suppliers and recipients would administer the reserve. If the consortium cannot meet its fuel supply obligations, the affected recipient states would petition the joint committee for permission to draw from the strategic reserve.

Ashton B. Carter, former U.S. assistant secretary of defense for international security policy, is Ford Foundation Professor of Science and International Affairs at Harvard's John F. Kennedy School of Government and codirector of the Preventive Defense Project. Stephen A. LaMontagne is a former research associate of the Preventive Defense Project.

Vol. 62, No. 1, pp. 24-25
DOI: 10.2968/062001009

To facilitate the removal of spent fuel from recipient states, the United States should work closely with foreign governments, industry, and the IAEA, to move ahead with plans to construct a shared storage facility in Russia. Moscow, which would pledge to not reprocess the spent fuel, would own and operate the facility and subject it to IAEA safeguards and inspections. Recipient states would pay a per-kilogram spent fuel removal charge that would cover facility construction and operation. The original supplier states would retain rights over any future transfer of their spent fuel.

In order to implement these recommendations, the governments of interested supplier states would negotiate, with IAEA assistance, a model safeguards agreement that would govern all consortium transactions as well as access to the strategic reserve. The agreement would specify a common set of nonproliferation obligations applicable to recipient states, including acceptance of existing Nuclear Suppliers Group export criteria, adoption of the IAEA Additional Protocol, implementation of U.N. Security Council Resolution 1540 (a nonproliferation measure), and a *temporary* commitment to abstain from indigenous enrichment and reprocessing, renewable every 10 years. If the supply regime proves effective over its first 10 years, recipient states might be willing to agree to further, perhaps indefinite, abstention from enrichment and reprocessing.

Over the long-term, supplier state governments could offer additional incentives exclusively to recipient states with track records of good behavior. For example, if growing demand for nuclear power should require the addition of capacity to the enrichment market, supplier states could offer recipient states the opportunity to take an equity and managerial stake in the construction and operation of new enrichment plants. These recipient states would enjoy priority access to enrichment plant output but would not have access to proliferation-sensitive technologies. In addition, supplier states could provide recipient states with assistance building new light water reactors or with opportunities to cooperate in developing advanced reactor concepts that reduce proliferation risks.

The multinational supply regime would offer incentives to all stakeholders. Industry participants would enjoy preferential access to new markets and the chance to prevent commercial competition. Supplier states would achieve nonproliferation benefits by slowing the spread of fissile material production technologies. Recipient states would avoid the enormous capital costs associated with constructing an indigenous nuclear fuel cycle as well as the political and environmental hassles associated with spent fuel management. Simply put, recipient states would benefit from avoiding activities that are economically unjustifiable in the first place.

Nevertheless, some states may continue to pursue enrichment and reprocessing technologies for non-economic reasons such as building nuclear weapons, developing naval nuclear propulsion, or boosting national pride. The multinational supply regime must therefore include punitive measures against these "holdouts." For example, the Nuclear Suppliers Group could adopt a presumption of denial of all nuclear exports to these states, and the IAEA could deny them seats on its Board of Governors. Suppliers could make certain benefits, such as reactor-related assistance and investment opportunities, available only to participating recipient states in good standing. A state that continues to hold out would arouse heightened suspicion. Thus, a multinational regime can facilitate the process of building international coalitions to confront holdouts with diplomatic pressure, economic sanctions, or even military force.

The effectiveness of the nonproliferation regime depends on its ability to evolve in response to emerging threats such as the red zone problem. With an effective fuel cycle supply regime, such as the one outlined above, the international community can keep the red zone clear.